



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Thomas FAIRFULL

Serial No.: 10/717,492

Filed: November 21, 2003

Art Unit: 3748

For: METHOD AND APPARATUS FOR IMPROVED COMBUSTION USING  
HYDROGEN AND OXYGEN

CLAIM OF PRIORITY

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicant for the above-identified application, by his attorney, hereby claims the priority date under the International Convention of Canadian Patent Application No. 2,412,367, filed November 22, 2002, and acknowledged in the Declaration of the subject application. A certified copy of the Application is attached.

Respectfully submitted,

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By

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Docket No.: 11009-0029  
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Specification and Drawings, as originally filed, with Application for Patent Serial No:  
**2,412,367**, on November 22, 2002, by **DYNAMIC FUEL SYSTEMS INC.**, assignee of  
Thomas Fairfull, for "Method and Apparatus for Improved Combustion Using Hydrogen  
and Oxygen".

  
Agent certificateur/Certifying Officer

November 23, 2003

Date

Canada

(CIP0 68)  
04-09-02

OPIC  CIPO

**ABSTRACT**

There is provided a method for improving combustion efficiency which method comprises the steps of introducing hydrogen or a hydrogen-oxygen gas into a mixing device, introducing an input hydrocarbon into the mixing device, within the mixing device mixing the hydrogen-oxygen gas and the hydrocarbon to form an output mixed fuel which is in turn delivered to a combustion device.

## **TITLE OF THE INVENTION**

METHOD AND APPARATUS FOR IMPROVED  
COMBUSTION USING HYDROGEN AND OXYGEN

## **FIELD OF THE INVENTION**

This application relates to a method and apparatus that uses a hydrogen and/or oxygen gas mixture to improve the combustion efficiency of combustion devices such as boilers, furnaces, burners and other heating devices.

## **BACKGROUND OF THE INVENTION**

It is well known that natural sources of fossil fuels and other hydro-carbons are depleting and as a result fuel costs are increasing. The cost of heating a building, dwelling, greenhouse or any other such structure which utilizes a combustion source to provide heat increases on an almost continuous basis. Thus, there have been numerous attempts to increase the efficiency of the boilers, furnaces, burners and other heating devices, at the source, for such heating applications.

Many of these attempts have not addressed the input to the combustion device but have concentrated in the operation of the device itself. It is nonetheless accepted that as the efficiency of the combustion improves the amount of hydro-carbons used as the combustion source will decrease thus saving valuable natural resources. Further, an increased efficiency in the combustion also results in fewer pollutants into the atmosphere. This is in addition to the tremendous costs saving available for the consumer coinciding with a reduction in the fuel required to produce the same amount of heat from the combustion device.

It is with these efficiencies in mind that the applicant has created a method and apparatus for improving the input to the combustion device. Within this context, the applicant has considered using hydrogen-oxygen gas mixtures, mixed with the input hydrocarbons, to be used as the fuel source for the combustion device. While the mixture of oxygen with the hydrocarbon has been contemplated in a number of internal combustion engine applications, it is the use of a hydrogen-oxygen gas mixture, typically generated through electrolysis, which is

- 2 -

contemplated for use in mixing with the input hydrocarbon in these common heating devices that is considered innovative and which will greatly improve heating efficiencies.

### **SUMMARY OF THE INVENTION**

It is thus an object of the invention to provide a method and apparatus for the mixing of a hydrogen-oxygen stream with an input hydro-carbon to produce an output gas mixture product to be used as an input for a combustion device.

There is provided in one aspect of the invention a method for improving combustion efficiency which method comprises the steps of introducing a hydrogen-oxygen gas into a mixing device, introducing an input hydrocarbon into the mixing device, within the mixing device mixing the hydrogen-oxygen gas and the hydrocarbon to form an output mixed fuel which is in turn delivered to a combustion device.

In another aspect of the invention, the hydrogen-oxygen gas is output from an electrolysis hydrogen generator.

In a further aspect of the invention, the mixing device is a static mixing device.

There is also provided an apparatus to improve the combustion efficiencies of a combustion device. The apparatus comprises an input line for the feed of hydrocarbon, and an input line for the feed of a hydrogen-oxygen gas mixture, those input lines feeding into a mixing device in which the hydrocarbon and hydrogen-oxygen gas mixture are mixed. There is also provided an output line for the mixed fuel product to deliver that product to the combustion device.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

These and other advantages will become apparent upon reading the following detailed description and upon referring to the drawings in which the:

FIGURE 1 is a schematic view of the apparatus of the present invention; and

FIGURE 2 is a detailed schematic view of a component of the present invention.

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- 3 -

While the invention will be described in conjunction with the illustrated embodiments, it will be understood that it is not intended to limit the invention to such embodiments. On the contrary, it is intended to cover all alternatives, modifications and equivalents may be included within the sphere and scope of the invention as defined by the appended claims.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

In the following description, similar features in the drawings have been given similar reference numerals.

Turning to the drawings, Figure 1 illustrates an apparatus 2 for use in improving the efficiency of a combustion device 4. That combustion device 4 can be any common combustion device such as a boiler, furnace, burner, heating element, space heater or any other device commonly used as a combustion source to provide heat. Such devices typically operate in the area of approximately 28% efficiency. Thus, there is a 28% conversion of available hydro-carbon energy to heat or work which is considered normal, and acceptable, in the industry.

The apparatus 2 further illustrates an input line 10 for hydrogen gas or a hydrogen-oxygen gas mixture emanating from a source 12. That source 12 can include any source for generating hydrogen or hydrogen-oxygen gas, including the electrolysis generator described in applicant's United States patent application entitled Hydrogen Generator.

The apparatus 2 of Figure 1 further illustrates an input 14 for a hydrocarbon. That hydrocarbon can be any one of a number of hydrocarbons typically used in combustion devices including but not limited to propane, methane, oil and the like. The input 14 emanates from a source (not shown) in the conventional sense in such combustion devices.

Both the input 12 of the hydrogen-oxygen gas and the input 14 of the hydrocarbon are delivered to a mixing device 20 upstream of the combustion device 4. As more particularly shown in Figure 2, the mixing device 20 comprises an input port 22 for receiving a hydrocarbon from input line 14 and an input port 24 for receiving the hydrogen gas or hydrogen-oxygen gas from input 10. The exact nature of the mixing device will depend on

- 4 -

the nature of the hydrocarbon to be burned. For example, if the fuel is a gas, it is contemplated that porous metal or metal ribbons 26 would be used to induce turbulence or mixing of the hydrocarbon and the hydrogen-oxygen gas. The invention further contemplates the use of other components within the mixing device to achieve an appropriate blend of the hydrocarbon and the hydrogen oxygen gas.

The mixing device then comprises an output port 28 connected to an output line 30 which then feeds the mixed gas fuel output from the mixing device 20 to the combustion device 4. As shown in Figure 1, the combustion device 4 can comprise controls 32, vent 34 and an output 36 for heated air, steam or hot water 36 as is customary in the art, without being affected by the use of the apparatus and method of the present invention.

The present invention contemplates the addition of hydrogen or hydrogen-oxygen gas mixture in the amount of 3% of the hydrocarbon flow rate. The increase in fuel efficiency should approach 70% as a result of more oxygen and hydrogen molecules being readily available to crack the chains of the hydrocarbon, thus completing combustion more efficiently and giving off more heat.

The mixing within the mixing device 20 is preferably achieved at similar pressures as those maintained in the input lines 10 and 14. Thus, the efficiency in the combustion is dramatically improved by the use of a comparatively small stream of hydrogen-oxygen gas product.

Thus, in use, the method contemplates the introduction of the hydrogen or hydrogen-oxygen gas mixture, sourced from a hydrogen generator such as an electrolysis generator, into a mixing device into which is also introduced the hydrocarbon to be burned. The mixing device then blends the hydrogen-oxygen gas mixture with the hydrocarbon in order to produce an output mixed gas product which is then used as the fuel in the combustion device 4. That fuel is then burned in the combustion device 4 in the ordinary course. Use of this method will be able to reduce the amount of fuel required to achieve the necessary combustion to produce the required heat or energy from the combustion device. Thus, the savings in the consumption of the hydrocarbon would be achieved.

Thus it is apparent, there has been provided in accordance with this invention a method and apparatus for the improved combustion of hydrocarbons that fully satisfies the

- 5 -

objects aims and advantages as set forth above. While the invention has been described above in conjunction with illustrated embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of foregoing description. Accordingly, this invention is intended to embrace all such alternatives, modifications and variations as fall within the sphere and broad scope of the invention.

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- 6 -

**WE CLAIM:**

1. A method of improving combustion efficiency in a combustion device comprising steps of:  
introducing a hydrogen-oxygen gas into a mixing device;  
introducing a hydrocarbon into said mixing device with said device, mixing  
said gas with said hydrocarbon into a mixed gas product; and  
feeding said mixed gas product to said combustion device.
2. The method of Claim 1 wherein said hydrogen-oxygen gas is the output from an  
electrolysis hydrogen generator device.
3. An apparatus for the improved combustion in a combustion device, said apparatus  
comprising;  
  
an input line for a hydrocarbon;  
an input line for a hydrogen-oxygen gas mixture  
a mixing device herein said hydrocarbon and hydrogen-oxygen gas mixture  
are mixed; and  
an output line for delivering said mixed product to said combustion device.
4. The apparatus of Claim 3 wherein said mixing device is a static mixing device.
5. The apparatus of Claim 3 further comprising of a hydrogen generator to generate said  
hydrogen-oxygen gas.

FIGURE 1

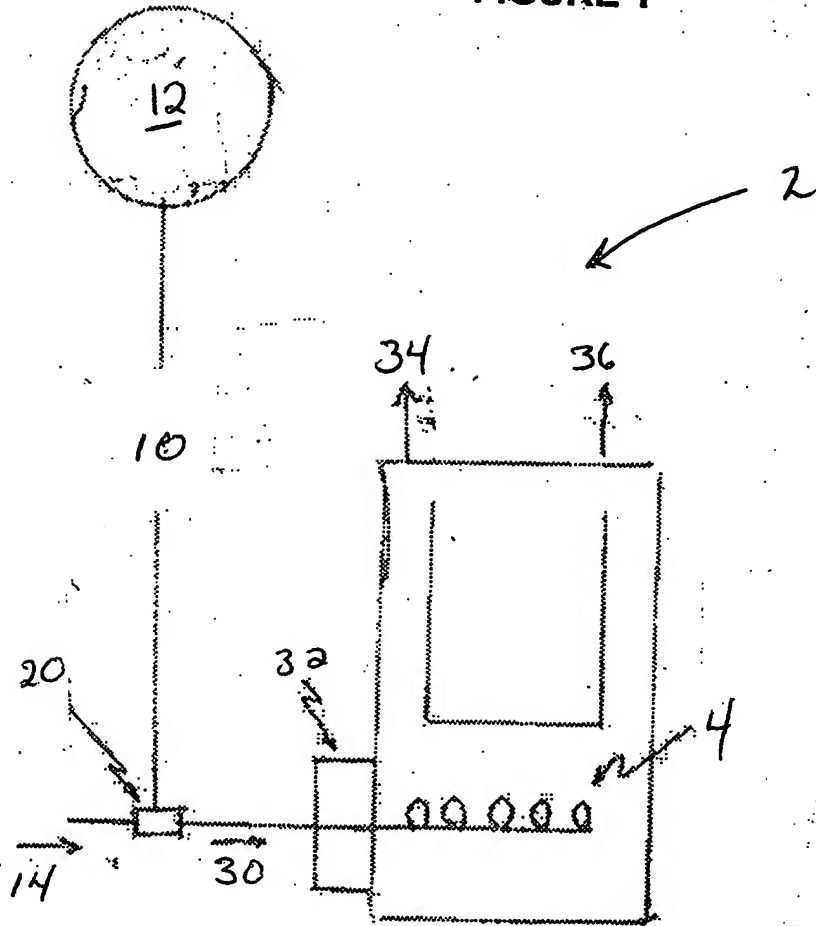


FIGURE 2

